Bioinorganic Chemistry (CHMD69H3)

Fall 2012

University of Toronto at Scarborough

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and by appointment

Course Description: This course examines the role of metal species in biological systems. Topics covered in this course include the occurrence, distribution and role of essential elements, variety of physical methods used to study bioinorganic molecules, chemistry of transition metals, an overview of biological ligands, general concepts in coordination chemistry, enzymes using metal ions for acid catalysis, electron transfer proteins, redox metalloenzymes and recent research on bionanotechnology and medicinal chemistry.

Recommended Text: Kraatz, Metzler-Nolte "Concepts and Models in Bioinorganic Chemistry", 2006 Wiley-VCH.

Suggested Readings:

i) Lippard, Berg, "Principles of Bioinorganic Chemistry", University Science Press
ii) Bertini, Gray, Lippard and Valentine "Bioinorganic Chemistry", University Science Press
iii) Kaim, Schwederski "Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life" Wiley-VCH
iv) Fausto da Silva and Williams "The Biological Chemistry of the Elements" Oxford Press

Methods of Evaluation:

Midterm Exam (25%) - Friday, October 19th (in class)
Short In-Class Presentation (15%) - Begins Friday Nov 9th
Final Examination (60%) – to be scheduled by UTSC

Course Materials: Lecture notes, journal articles for discussion, announcements, handouts and presentation outline will be posted before class on the intranet. You are responsible for the materials covered in class as well as the student presentations. In addition to the class text book, your resources include suggested text books, journal articles (listed on the lecture slides), the web (but be careful about choosing reliable sites), your classmates and Dr. N. Thavarajah.

Short In-Class Presentation: Presentations will begin on Nov 9th. The guidelines for choosing a topic for your presentation will be posted on September 14th. I welcome all of you to discuss your presentation topics with me during my office hours or you can make an appointment to arrange a meeting. Presentation proposals are due by October 5th.

Email Policy: Please use a valid "utoronto.ca" or "utsc.utoronto.ca" account for all CHMD69H correspondence. If you use other accounts, it may be filtered out as spam and may not be received.

Accessibility: Students with diverse learning styles and needs are welcome in this course. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact us and or the Accessibility Services as soon as possible: SW 302, (416) 287-7560 or ability@utsc.utoronto.ca

Academic Integrity:
Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you, the students within this community, and the value of the degree towards which you are all working so diligently.
According to Section B of the University of Toronto's Code of Behaviour on Academic Matters http://www.governingcouncil.utoronto.ca/policies/behaveac.htm which all students are expected to know and respect, it is an offence for students to:

- To use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- To include false, misleading or concocted citations in their work.
- To obtain unauthorized assistance on any assignment.
- To provide unauthorized assistance to another student. This includes showing another student completed work.
- To submit their own work for credit in more than one course without the permission of the instructor.
- To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

There are other offences covered under the Code, but these are by far the most common. Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.

Schedule for CHMD69H3
Fall 2012

	Date	Topics	Text
1	Sept 14th	I) Review on Inorganic Chemistry Essentials, Biochemistry Fundamentals II) Biodistribution of Metal Ions	Ch 1
2	Sept 21st	I) Toxicology of Metals II) Redox Process in Enzymes	Ch 3 & 4.1, 4.4
3	Sept 28th	I) Biological Electron Transfer II) Organometallic Complexes	Ch 5.1-5.2, 5.3-5.4 & 6.1-6.4
4	Oct 5th	I) Nucleic Acids and Metals II) Nucleases and Peptidases	Ch 7 & 8
		****Presentation Proposals are Due**	
5	Oct 12th	I) Heme in Biological Electron Transfer and Nickel Porphinoids II) Vanadium Chemistry	9.1-9.2.1.2, 9.2.3-9.2.4 10.1-10.1.2.1
6	Oct 19th	Molybdenum Enzymes	11.1-11.1.2.1, 11.1.2.3
		Midterm Exam	
7	Oct 26th	I) Iron Containing Oxygen Carriers II) Iron-Sulfur Chemistry	12.1-12.4.2 & 13.1-13.5.3.3
8	Nov 2nd	I) Nickel Enzymes II) Hydrogenases II) Copper Enzymes	14.1-14.4.1, 15.1-15.5 &16.1-16.2.3.3
9	Nov 9th	**Short In-Class Presentations**	
10	Nov 16th	I) Nitrogenases II) Zinc Enzymes	10.1.2.2., 10.2.2 & 17.1-17.2, 17.2.1.2, 17.2.1.4, 17.2.2.2-17.3.2
11	Nov 23rd	Metals in Medicine	Ch 2
	Nov 30th	**Last Lecture: Review**	
	Dec 4th-6th	**Study Break**	
	Dec 7th-21st	**Final Exam Period**	

Note: This is a rough schedule. Not all the materials in each chapter will be covered in lectures. The lectures will be highly interactive. I'll be posting journal articles on recent research in the area of Bioinorganic Chemistry. We will be discussing these articles in class. Please read ahead.